

REMARKS

In response to the Office Action mailed on May 4, 2006, Applicants respectfully request reconsideration based on the above claim amendments and the following remarks. Applicants respectfully submit that the claims as presented are in condition for allowance.

Claims 1, 8, 12, 14, 19, 22, 24-25 and 29 have been amended, leaving Claims 1-29 for consideration upon entry of the present amendment. No new matter has been added by the amendments.

Support for Claim Amendments

The amendments to Claims 1, 14, 24-25 and 29 are fully supported in Applicants' specification; see, for example, paragraphs 18 and 24-25. Claims 8, 12, 19 and 22 were amended to correct antecedent basis errors introduced by the amendments to Claims 1, 14, 24-25 and 29.

Claim Rejections Under 35 U.S.C. § 102(b)

Claims 1-7, 10, 14-18, and 21 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,314,494 B1 to Keltcher, et al. (hereinafter "Keltcher"). Applicants respectfully traverse the rejection because all of the elements in Claims 1-7, 10, 14-18, and 21 are not found, either expressly or inherently described, in Keltcher.

Claim 1, as amended, recites "each said tag includes a reference history field and a pointer to at least one line in the prefetch buffer that is from the associated page, access to the lines in the prefetch buffer is controlled by the tag cache, and the reference history field includes information about how the lines from the associated page have been accessed in the past and is utilized to determine which lines in the associated page should be added to the prefetch buffer when the tag is added to the tag cache." (Emphasis added.)

Keltcher teaches a size configurable data buffer that includes both cache data memory registers and cache prefetch memory registers. The amount of space allocated to each of these cache registers can be modified by a computer controller (Keltcher; Abstract). Keltcher also teaches a TAG cache memory to keep track of which lines of data are stored in the cache data and prefetch registers. The TAG cache memory includes memory locations for storing TAG

addresses that correspond to addresses of the particular information stored in the cache memory. The TAG addresses are used to determine when an address from a controller (the address includes twenty TAG address bits) is one in which the cache memory contains the requested information. (Keltcher; Col. 1, lines 38-65 and Col. 4, lines 17-29.)

The TAG addresses taught by Keltcher do not include “each said tag includes a reference history field” as recited by Claim 1. Further Keltcher does not teach that the contents of the TAG cache memory include “a reference history field [that] includes information about how the lines in the associated page have been accessed in the past and is utilized to determine which lines from the associated page [in the memory device] should be added to the prefetch buffer when the tag is added to the tag cache,” as recited by Claim 1.

Therefore, Claim 1 is not anticipated by Keltcher for at least the reason that Keltcher fails to disclose, either expressly or inherently, the elements “each said tag includes a reference history field ... [that] includes information about how the lines in the associated page have been accessed in the past and is utilized to determine which lines from the associated page [in the memory device] should be added to the prefetch buffer when the tag is added to the tag cache,” as recited in Claim 1.

Since it contains similar features, Claim 14 is patentable over Keltcher for at least the reasons given above for Claim 1. Claims 2-7 and 10 depend from Claim 1, and thus are believed to be allowable at least due to their dependency on Claim 1. Claims 15-18 and 21 depend from Claim 14, and thus are believed to be allowable at least due to their dependency on Claim 14.

Blaner. Applicants further submit that the element “a reference history field” as recited in amended Claim 1, is not taught by U.S. Patent 5,423,011 to Blaner, et al (hereinafter “Blaner”) as suggested by the Examiner in the Office Action mailed on May 4, 2006. The Examiner looks to Column 8, lines 23-30 of Blaner for teaching “a reference history field.” Blaner is directed to the processing of branch instructions in a digital computer. (Blaner; Col. 1, lines 40-41.) Blaner teaches that branch prediction schemes are utilized to reduce the performance penalty caused by branch instruction execution and that one such scheme involves dynamic prediction of branch outcomes by tagging branch instructions in a cache with predictive information regarding their outcomes. Typically, the predictive information is in the form of bits which record the execution

history of the associated branch instructions. (Blaner; Col. 1, lines 47-60.) Blaner teaches a way to save the branch prediction bits associated with the cache line when the cache line is displaced with a new cache line. The saved branch prediction bits are used if/when the cache line is brought back into the cache. (Blaner; Col. 2, lines 36-42.) In contrast to Claim 1, Blaner is directed to recording previous computer instruction branches taken by a computer program and does not teach “a reference history field [that] includes information about how the lines in the associated page [in the memory device] have been accessed in the past.” Further, Blaner utilizes the predictive information to predict which computer instructions will be executed next. This is not the same as “a reference history field ... utilized to determine which lines from the associated page should be added to the prefetch buffer when the tag is added to the tag cache” as recited in Claim 1. Still further, the branch prediction bits in Blaner relate to a single line in the cache. In contrast, the “reference history field” in Claim 1 relates to a “tag” which is “associated with one of the pages in the memory device” where “pages [are] divided into a plurality of individually addressable lines.” For at least these reasons, Claim 1 is not anticipated by Blaner. Since it contains similar features, Claim 14 is patentable over Blaner for at least the reasons given above for Claim 1. Claims 2-7 and 10 depend from Claim 1, and thus are believed to be allowable at least due to their dependency on Claim 1. Claims 15-18 and 21 depend from Claim 14, and thus are believed to be allowable at least due to their dependency on Claim 14.

Claim Rejections Under 35 U.S.C. § 103(a)

Claim 11 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Keltcher as applied to Claim 1, further in view of U.S. Patent No. 5,544,342 to Dean (hereinafter “Dean”). Applicants respectfully traverse the rejection because Keltcher in view of Dean fails to teach or suggest all of the elements in Claim 11.

As stated above, Keltcher fails to disclose all of the elements of Claim 1, from which Claim 11 depends. In addition, Dean fails to teach or suggest at least the elements “each said tag includes a reference history field ... [that] includes information about how the lines in the associated page have been accessed in the past and is utilized to determine which lines from the associated page [in the memory device] should be added to the prefetch buffer when the tag is added to the tag cache,” as recited in Claim 11. Therefore, Dean does not cure the deficiencies

of Keltcher with respect to Claim 11. Accordingly, neither Keltcher nor Dean, alone or in combination, teach or suggest all of the elements of Claim 11.

Claim 24 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Keltcher and further in view of Dean. Applicants respectfully traverse the rejection because Keltcher in view of Dean fails to teach or suggest all of the elements in Claim 24.

As described above, with respect to Claim 1, Keltcher fails to teach or suggest “a reference history field.” Specifically, with respect to Claim 24, Keltcher fails to teach or suggest the elements “each tag includes a reference history field that includes information about how lines in the corresponding page have been accessed in the past and is utilized to determine which lines from the corresponding page should be added to the random access memory when the tag is added to the second cache device,” as recited in amended Claim 24. In addition, Dean fails to teach or suggest at least the elements “each tag includes a reference history field that includes information about how lines in the corresponding page have been accessed in the past and is utilized to determine which lines from the corresponding page should be added to the random access memory when the tag is added to the second cache device,” as recited in Claim 24. Therefore, Dean does not cure the deficiencies of Keltcher with respect to Claim 24. Accordingly, neither Keltcher nor Dean, alone or in combination, teach or suggest all of the elements of Claim 24.

Claim 25 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Keltcher and further in view of Dean. Applicants respectfully traverse the rejection because Keltcher in view of Dean fails to teach or suggest all of the elements in Claim 25.

As described above, with respect to Claim 1, Keltcher fails to teach or suggest “a reference history field.” Specifically, with respect to Claim 25, Keltcher fails to teach or suggest the elements “each tag includes a reference history field including information about how lines in the corresponding page have been accessed in the past ... and the prefetch lines are determined in response to contents of the reference history field”, as recited in amended Claim 25. In addition, Dean fails to teach or suggest at least the elements “each tag includes a reference history field including information about how lines in the corresponding page have been accessed in the past ... and the prefetch lines are determined in response to contents of the

reference history field” as recited in Claim 25. Therefore, Dean does not cure the deficiencies of Keltcher with respect to Claim 25. Accordingly, neither Keltcher nor Dean, alone or in combination, teach or suggest all of the elements of Claim 25.

Claim 26 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Keltcher and further in view of Dean. Applicants respectfully traverse the rejection and submit that Claim 26 is allowable at least due to its dependency on Claim 25.

Claim 27 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Keltcher as applies to Claim 25 and further in view of Dean. Applicants respectfully traverse the rejection and submit that Claim 27 is allowable at least due to its dependency on Claim 25.

Claim 28 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Keltcher as applies to Claim 25 and further in view of Dean. Applicants respectfully traverse the rejection and submit that Claim 28 is allowable at least due to its dependency on Claim 25.

Claim 29 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Keltcher and further in view of Dean. Applicants respectfully traverse the rejection because Keltcher in view of Dean fails to teach or suggest all of the elements in Claim 29.

As described above, with respect to Claim 1, Keltcher fails to teach or suggest “a reference history field.” Specifically, with respect to Claim 29, Keltcher fails to teach or suggest the elements “each tag includes a reference history field including information about how lines in the corresponding page have been accessed in the past ... and the prefetch lines are determined in response to contents of the reference history field”, as recited in amended Claim 29. In addition, Dean fails to teach or suggest at least the elements “each tag includes a reference history field including information about how lines in the corresponding page have been accessed in the past ... and the prefetch lines are determined in response to contents of the reference history field” as recited in Claim 29. Therefore, Dean does not cure the deficiencies of Keltcher with respect to Claim 29. Accordingly, neither Keltcher nor Dean, alone or in combination, teach or suggest all of the elements of Claim 29.

Claims 8-9, 12-13, 19-20 and 22-23 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Keltcher as applies to Claims 1 and 14, further in view of U.S. Patent

4,658,351 to Teng (hereinafter "Teng") and Blaner. Applicants respectfully traverse the rejection because Keltcher in view of Dean fails to teach or suggest all of the elements in Claim 8-9, 12-13, 19-20 and 22-23.

As stated above, Keltcher fails to disclose all of the elements of Claim 1, from which Claims 8-9 and 12-13 depend. In addition, Dean, Teng and Blaner fail to teach or suggest, alone or in combination with each other or Keltcher, at least the elements "each said tag includes a reference history field ... [that] includes information about how the lines in the associated page have been accessed in the past and is utilized to determine which lines from the associated page [in the memory device] should be added to the prefetch buffer when the tag is added to the tag cache," as recited in Claim 1. Therefore, neither Dean nor Teng nor Blaner cure the deficiencies of Keltcher with respect to Claim 1. Accordingly, neither Keltcher nor Dean nor Teng nor Blaner, alone or in combination, teach or suggest all of the elements of Claim 8-9 and 12-13. Since it contains similar features, Claim 14 is patentable for at least the reasons given above for Claim 1. Claims 19-20 and 22-23 depend from Claim 14, and thus are believed to be allowable at least due to their dependency on Claim 14.

Conclusion

In view of the foregoing remarks and amendments, Applicants submit that the above-identified application is now in condition for allowance. Early notification to this effect is respectfully requested.

If any issues remain, the Examiner is invited to contact the undersigned at the telephone number below.

If there are any charges with respect to this response or otherwise, please charge them to Deposit Account 50-0510 maintained by Applicants' attorneys.

Respectfully submitted,

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